

BASIS FOR THE AMENDMENT

Claims 1-52 are active in the present application. Claims 35-52 are new claims. Support for the new claims is found in the paragraph bridging pages 9 and 10 and the original claims. Claim 24 has been rewritten as an independent claim.

No new matter is added.

REQUEST FOR RECONSIDERATION

Previously presented Claim 24 is now rewritten in independent form. Applicants submit that Claim 24 is now in condition for allowance as indicated by the Office's statement that the subject matter of Claim 24 is allowable in the Office Action of December 20, 2005.

Applicants have claimed an aluminum electrophotoconductive tube that is obtained by gas-slip casting of an aluminum alloy (e.g., Claim 1). Applicants have disclosed that certain properties of the metal from which the electrophotoconductive tube is made are important with respect to the ability to obtain good image quality in a reprographic device within which the electrophotoconductive tube is eventually used. These properties include grain structure (page 2, lines 22-23; page 8, lines 7-8; and page 10, lines 11-12).

For example:

Grain size is an important characteristic of the surface feature of the invention electrophotoconductive tube. Grain size and structure of the electrophotoconductive tube is substantially less than the grain size and structure obtained in electrophotoconductive tubes prepared by conventional casting methods. Grain size and structure may be determined by, for example, dendrite arm spacing, billet slice test, inverse grain segregation, and intermetallic distance. Figure 8 provides a comparison of the surface of the invention electrophotoconductive tube and a tube prepared from a conventional casting process. The difference in grain structure may be quantified by comparing the relative sizes and density of the grains of the two surfaces. (Page 10, lines 11-19).

Applicants have shown that an electrophotoconductive tube made by gas-slip processing has finer grain (e.g., smaller grain) than an electrophotoconductive tube made by conventional processing (see page 15, lines 3-4 and Figures 5-9). As already mentioned above, grain size is an important characteristic of surface quality and image reproduction quality. Large grain size means that the crystal grains of the metal of the tube are large. If large crystallites of the metal are present at the surface of the metal, the image contrast that

may be reproduced with the metal surface decreases. When grain size is finer (e.g., smaller), a higher contrast can be achieved and improved image quality may be obtained.

Applicants submit that it is readily recognized that, during crystallization, grain size increases as cooling time increases. This is evident to the lay person as well as to those of skill in the art. For example, a saturated solution of sugar or salt forms crystals of sugar or salt when the solution is cooled. If the cooling is carried out slowly, crystals of larger size are obtained in comparison to the size of the crystal obtained when cooling is carried out at a relatively faster rate.

The same effect is seen when processing (e.g., casting) metals. Applicants submit that one of ordinary skill in the art would expect that slow cooling would lead to larger metal crystallites and hence coarser metal surface grain (e.g., larger grain size). The prior art cited by the examiner, i.e., Naess (U.S. 5,632,323), discloses that gas-slip processing will lead to slower cooling:

Studies of the flow of water show that the air, which deflects the skirt of water, also penetrates and forms bubbles in the water. Consequently, in addition to the reduced cooling which is achieved by lowering the point at which the water meets the cast billet, further reduced cooling is achieved due to the insulating effect of the bubbles and because portions of the water in the flow of water are blown away from the cast billet 2. (Underlining added; column 3, lines 46-53).

Applicants submit that the Naess patent would not have led those of ordinary skill in the art to the presently claimed electrophotoconductive tube (e.g., Claim 1) because the cited prior art states that the conditions of gas-slip casting would result in slower cooling which may have the effect of increasing grain size. Increased grain size would provide poorer surface quality and thus gas-slip casting may be expected to provide an inferior electrophotoconductive tube. Thus, Applicants submit that those of skill in the art would not have foreseen that gas-slip casting would be an acceptable means for preparing an

electrophotoconductive tube much less than gas-slip casting would provide an electrophotoconductive tube of improved surface characteristics.

Applicants have shown that gas-slip casting provides an improved surface and for this and other reasons is patentable over the prior art of record.

Applicants have shown other improvements over conventionally cast electrophotoconductive tubes. For example, Table 4 of the present specification compares the defect rate for CT Foam (e.g., the bubbles caused by out gassing when a charge transfer layer is coated onto an electrophotoconductive tube). Table 4 shows that a CT layer on a conventionally produced electrophotoconductive tube has twice as many material defects as the CT layer of an electrophotoconductive tube prepared by gas-slip casting (see "CT Foam" section of Table 4).

Out gassing may be related to the porosity of the metal surface (e.g., the H₂ porosity). In fact, page 10, lines 23-28 of the present specification discloses that low H₂ porosity is desirable. Applicants have shown that the claimed electrophotoconductive tube may have an H₂ porosity that is lower than the H₂ porosity of conventionally cast electrophotoconductive tubes. Thus, dependent Claims 10 and 22 are further patentable over the prior art.

The Office rejected Claims 3, 11, 14-15, 23, and 27 on the grounds that the claims contain terms such as "substrate defects" and "substantially free of a weld line" which are relative terms. The Office thereby concluded that the claims are indefinite.

Applicants traverse the rejection on the grounds that the specification as originally filed includes sufficient information for one of ordinary skill in the art to determine whether a particular aluminum tube or device meets the requirements of the claims in question. For example, the following is disclosed on page 9, line 7 – page 10, line 7:

Lamination defects may be from about 10 μ m to several millimeters in length. It is preferable that the optical photoconductor drum not have any visible lamination defect. Weld line defects range in length from less than 1 mm to the

entire length of the electrophotoconductive tube. Weld line defects are preferably not visible on the optical photoconductor drum. In some cases the weld line is substantially invisible to the naked eye. Substantially invisible means that a weld line showing a clear demarcation between areas of the surface of the optical photoconductor drum are not present or any weld line is visible along only a portion of the drum. Banding defects are preferably not visible on the optical photoconductor drum or, if visible, preferably do not traverse the entire girth of the drum. Heat streak or featherline defects are manifested in differences in color and/or striation on the surface of the drum, these defects are preferably not present on the optical photoconductor drum. If featherline or heat streak defects are present on the invention optical photoconductor drum they preferably are diffuse and do not project from the surface of the drum. Cut-away defects are characterized as rough patches on the optical photoconductor drum surface and may vary in size from 10 to 50 mm². Preferably no rough patches are visibly evident on the surface of the optical photoconductor drum. If cut-away defects are present on the surface of the optical photoconductor drum, the optical photoconductor drum is rejected as unusable. (Underlining added).

Thus, the specification as originally filed not only provides an explicit definition for the term “substantially invisible”, but further defines different defects such as cut-away defects, feather lines, rough patches, and banding defects, etc. Applicants thus submit that the use of the relative term “substantially” is not indefinite in view of the definitions provided in the specification.

Applicants draw the Office’s attention to MPEP § 2173.05(b) – Relative Terminology:

The fact that claim language, including terms of degree, may not be precise, does not automatically render the claim indefinite under 35 U.S.C. § 112, second paragraph. (Citations omitted). Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification. (Underline added).

Applicants draw the Office’s attention in particular to MPEP § 2173.05(b)(D) wherein the term “substantially” is described. The courts have found instances where the term “substantially” is definite when the specification provided general guidelines regarding the

meaning of such terms. Applicants submit that the present claims should be given the same treatment. Applicants provided an explicit definition of “substantially invisible” and concurrently provided explicit examples of surface defects.

Applicants respectfully request withdrawal of the rejection.

Applicants draw the Office’s attention to new dependent Claims 35-52 wherein the claimed article either has no defects, or has the particular defects recited in the new dependent claims.

The Office rejected Claims 7-9 and 19-21 as obvious in view of a combination of Naess (U.S. 5,632,323) and Tilak (U.S. 6,675,870).¹ Applicants submit that the limitations of at least Claims 7-9 and 19-21 are further not suggested or disclosed by the prior art relied upon by the Office. With respect to Claims 7 and 19, neither of the prior art references disclose a method of gas-slip casting without filtering. In fact, Tilak discloses examples that must include in-line coolant filtering (column 16, lines 13-16). Applicants thus submit that the subject matter of Claim 7 is not obvious in view of the cited prior art.

With respect to the subject matter of Claims 8-9 and 20-21, Applicants submit that neither of Naess nor Tilak discloses an aluminum alloy that further comprises a grain refiner or titanium boride. Because the prior art neither discloses nor suggests the limitations of Claims 8-9 and 20-21, the prior art relied upon by the Office cannot render the subject matter of these claims obvious.

Applicants respectfully request withdrawal of the rejections of Claims 7-9 and 19-21.

Applicants thank Examiner Goodrow for the helpful and courteous discussion of March 3, 2006. During the discussion, Applicants’ U.S. representative presented arguments that the prior art disclosure of direct chill gas-slip processes does not inherently or necessarily

¹ Applicants note that the present specification incorporates the Naess patent by reference on page 6, line 9.

disclose the particular aluminum electrophotoconductive tube of the present claims and therefore the presently claimed subject matter is patentable over the cited prior art.

The Examiner stated that *SmithKline Beecham v. Apotex*, decided by the Federal Circuit on February 24, 2005 restricts the Office's ability to allow product-by-process claims. *SmithKline* states the following:

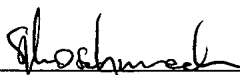
[T]he ultimate issue is simply whether the prior art disclosure of a product precludes a future claim to that same product when it is made by an allegedly novel process.

The *SmithKline* facts are different from the present facts. Here, the product (i.e., a photoconductive tube made by gas-slip processing) is new. There is no evidence of record that such a product otherwise exists in the prior art. Thus, the *SmithKline* decision is not necessarily the deciding factor whether the present product-by-process claims should be allowed. Instead, whether the electrophotoconductive tube of Claim 1 is new should be considered. Applicants submit that the electrophotoconductive of the invention is new and therefore is patentable.

Applicants submit that all now-pending claims are in condition for allowance and respectfully request withdrawal of the rejections.

Respectfully submitted,

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